

REMARKS

Claims 1 and 3-11 are pending in the present application. Claims 1 and 3-11 have been amended. Claim 2 has been canceled.

Priority Under 35 U.S.C. 119

Applicant notes the Examiner's acknowledgment of the Claim for Priority under 35 U.S.C. 119, and receipt of the certified copy of the priority document.

Claim Rejections-35 U.S.C. 103

Claims 1-11 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of the Chen reference (U.S. Patent No. 6,838,214). This rejection is respectfully traversed for the following reasons.

The manufacturing method for a liquid crystal display panel having a high aperture ratio of claim 1 includes in combination "applying a photo-etching process using a half-tone mask to the protection layer so as to form openings respectively above the thin film transistors and at the outer lead bonding area, wherein the insulation layer at the outer lead bonding area is exposed through the openings"; and "expanding the openings by further etching the protection layer and the insulation layer so as to form via holes exposing portions of the thin film transistors and the metal wires". Applicant respectfully submits that claim 1 would not have been obvious in view of the prior art as relied upon by the Examiner for at least the following reasons.

In claim 1 a photo-etching process using a half-tone mask is carried out on the protection layer to form openings that expose the insulation layer, and a further etching is also carried out on the protection layer and the insulation layer to expand the openings and expose the thin film transistors and the metal wires.

In contrast, subsequent deposition of protection layer 18 as described beginning on page 2, line 2 of the present application, Applicant's admitted prior art carries out a fourth photo-etching process to form holes that directly expose gate line 122, as shown in Fig. 1. That is, Applicant's admitted prior art does not apply a photo-etching process using a half-tone mask and also a further etching, as would be necessary to meet the features of claim 1.

More particularly, Applicant's admitted prior art does not disclose or suggest both a photo-etching process using a half-tone mask on a protection layer to form openings that expose an insulation layer, and a further etching on the protection layer and the insulation layer to expand the openings to expose thin film transistors and metal wires.

As noted above, in Applicant's admitted prior art a fourth photo-etching process on the protection layer and the insulation layer exposes gate lines 122. The process in Applicant's admitted prior art thus undesirably results in via holes so deep that contact impedance increases, and also results in cracking problems. Accordingly, Applicant respectfully submits that the manufacturing method for a liquid crystal display panel having a high aperture ratio of claim 1 would not have been obvious in view of the prior art as relied upon by the Examiner taken singularly or together, and that this rejection,

insofar as it may pertain to claims 1 and 3-11, is improper for at least these reasons.

With further regard to this rejection, the Examiner has acknowledged that Applicant's admitted prior art does not disclose a photo-etching process using a half-tone mask. To overcome this acknowledged deficiency, the Examiner has alleged that the Chen reference "teaches in figs. 12-19 using a half-tone mask, col. 4, lines 34-52". The Examiner has asserted that Chen gives "motivation" in col. 5, lines 11-29. The Examiner has further alleged that it would have been obvious "to recognize that combining Chen's process with AAPA's invention would have been beneficial because it helps form more complex and precisely controlled features than conventional masks". Applicant respectfully disagrees for the following reasons.

The Chen reference is directed to a method of fabricating a rim-type phase shift mask. That is, the Chen reference merely teaches how to make a mask, not how to use a half-tone mask as asserted by the Examiner. In particular, as described beginning in col. 6, line 45 of the Chen reference, the invention provides a method that creates a rim-type phase shift mask. The Chen reference does not disclose or teach fabrication of liquid crystal display panels or semiconductor devices using the rim-type phase shift mask.

Moreover, col. 5, lines 11-29 of the Chen reference as relied upon by the Examiner for motivation merely addresses design parameters that may be selected or considered when creating a phase shift mask. It is unclear how this would provide any motivation to modify Applicant's admitted prior art, or even what the modification would

be.

Accordingly, Applicant respectfully submits that the Chen reference merely discloses how to make a rim-type phase shift mask, and thus would provide no motivation or teaching that could be used to modify the liquid crystal display panel manufacturing process of Applicant's admitted prior art. The Chen reference would provide no motivation to modify the process of Applicant's admitted prior art to include both a photo-etching process using a half-tone mask on a protection layer to form openings that expose an insulation layer, and a further etching on the protection layer and the insulation layer to expand the openings to expose thin film transistors and metal wires. Applicant therefore respectfully submits that the manufacturing method for a liquid crystal display panel having a high aperture ratio of claim 1 would not have been obvious in view of the prior art as relied upon by the Examiner taken singularly or together, and that this rejection, insofar as it may pertain to claims 1 and 3-11, is improper for at least these additional reasons.

With further regard to this rejection, the prior art as relied upon by the Examiner does not appear to disclose or suggest transistors having a back-channel etching structure, as featured in claim 5. Applicant therefore respectfully submits that claim 5 would not have been obvious in view of the prior art as relied upon by the Examiner taken singularly or together, for at least these additional reasons.

Conclusion

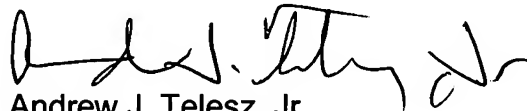
The Examiner is respectfully requested to reconsider and withdraw the corresponding rejection, and to pass the claims of the present application to issue, for at least the above reasons.

In the event that there are any outstanding matters remaining in the present application, please contact Andrew J. Telesz, Jr. (Reg. No. 33,581) at (571) 283-0720 in the Washington, D.C. area, to discuss these matters.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment for any additional fees that may be required, or credit any overpayment, to Deposit Account No. 50-0238.

Respectfully submitted,

VOLENTINE FRANCOS & WHITT, P.L.L.C.

A handwritten signature in black ink, appearing to read 'Andrew J. Telesz, Jr.', with a stylized flourish at the end.

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